

## Homework #8

Due:

1. Read section 6 “The Beam-Beam Problem” of the handout “Nonlinear Problems in Accelerator Physics.”
2. Experiment with the link “Beam-beam map” at the bottom of <http://www.rhichome.bnl.gov/PPA> . Observe how the location of the islands, and their sizes, depend on tune “Q” and beam-beam parameter “xi”. Confirm the theoretical behavior predicted in Figure 5b (page 315) of the handout. (If, for example  $Q \approx 1/3 \approx 2/6$ , then the relevant line in Figure 5b is the one labeled “6”.)
3. Using the link “Beam-beam map with tune modulation”, reproduce the four sub-plots in Figure 7 of the handout (page 320). Varying “xi” from 0.004 to 0.006 illustrates how overlapping islands lead to chaos. (Note that the control parameter “Tm” in the applet corresponds to “1/Qs” in Figure 7.)